

Claims

We claim:

1. A disk storage medium comprising:

2 a disk substrate;

3 a storage area provided on said disk substrate for recording

4 data; and

5 a circumferential landing zone provided on an area of said
6 disk substrate other than said storage area, the landing zone
7 being used for landing a head/slider which has air bearing
8 surfaces for floating a read-write head which reads out data from
9 said storage area or writes data to said storage area; and

10 said landing zone has a circumferential free zone which
11 faces a minimum fly height area of said head/slider which is
12 lowest in fly height among said air bearing surfaces and also has
13 a circumferential bump zone adjacent to said free zone;

14 said bump zone is formed with bumps protruding from the
15 surface of said disk substrate; and

16 said free zone has no bumps.

1 2. The disk storage medium of Claim 1, wherein said bumps
2 comprise laser bumps formed by irradiating laser light on the
3 said disk substrate.

1 3. The disk storage medium of Claim 1, wherein said bump
2 zone is provided on both the inner circumferential side and the
3 outer circumferential side of said free zone.

4. The disk storage medium of Claim 2, wherein said bump zone is provided on both the inner circumferential side and the outer circumferential side of said free zone.

1 5. A disk drive comprising:

2 a head/slider having an air bearing surface for floating a
3 head/slider over a rotating disk;

4 the disk having a disk substrate, a storage medium on at
5 least a portion of a surface of the disk, the storage medium
6 having a storage area for recording data, the disk having a
7 circumferential landing zone on an area of the disk other than
8 said storage area, the circumferential landing zone being
9 partially textured;

0 the landing zone having a texture free zone which faces a
1 minimum fly height area of the air bearing surface of the
2 head/slider when the head/slider is landing and also having a
3 circumferential bump zone adjacent to said free zone, the bump
4 zone being formed with bumps protruding from the surface of said
5 disk, the free zone having no bumps; and

6 a landing position control unit for moving the head/slider
7 so that the minimum fly height area of said head/slider is
8 positioned over the free zone of said disk storage medium when
9 landing said head/slider.

1 6. The disk drive of claim 5 wherein the head/slider has
2 at least an inner and an outer rail with the inner rail being
3 closest to a center of the disk and wherein the minimum fly
height area is on the inner rail.

1 7. The disk drive of claim 5 wherein the bumps have a
2 height above the surface such that the minimum fly height area of
3 the head/slider does not touch the surface of the disk during
4 landing.

1 8. The disk drive of claim 5 wherein the bumps have a
2 height above the surface equal to or greater than a difference
3 $\Delta H1$ between a fly height of a rear end portion of a side rail
4 and a fly height of a rear end portion of the center rail.

1 9. A method of operating a disk drive comprising the steps
2 of:

3 rotating a disk under a head/slider having an air bearing
4 surface and flying the head/slider over the disk;

5 positioning the head/slider over a area on the disk which
6 includes a textured area and an untextured area with the
7 untextured area being under an area on the air bearing surface
8 having a lowest flying height;

9 reducing a rotation rate of the disk to allow a portion of
0 the air bearing surface not having the lowest flying height to
1 contact the textured area of the landing zone first; and
2 stopping the disk.

3 10. The method of claim 9 wherein the head/slider has at
4 least an inner and an outer rail with the inner rail being
5 closest to a center of the disk and wherein the minimum fly
6 height area is on the inner rail.

11. The method of claim 9 wherein the textured area has a plurality of bumps protruding above a surface of the disk, the bumps having a height above the surface such that the minimum fly height area of the head/slider does not touch the surface of the disk during landing.

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forming the sides -

1 12. The method of claim 11 wherein the bumps have a height
2 above the surface equal to or greater than a difference ΔH_1
3 between a fly height of a rear end portion of a side rail and a
4 fly height of a rear end portion of the center rail.